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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/715,869	11/17/2003	Daniele Paolo David Piloni	905900-287	5597

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EXAMINER

LU, TOM Y

ART UNIT	PAPER NUMBER
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2621

DATE MAILED: 03/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/715,869

Applicant(s)

PIPONI, DANIELE PAOLO DAVID

Examiner

Tom Y Lu

Art Unit

2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement filed on 10/05/2004 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered. The AN reference is not considered herein because the reference copy is incomplete. However, the examiner finds the AN reference to be relevant to the rejection has incorporated the entire reference in this office action. The copy of the whole reference can be downloaded at the URL link of http://www.ri.cmu.edu/pub_files/pub3/dellaert_frank_2001_1/dellaert_frank_2001_1.pdf.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 1-25 are rejected under 35 U.S.C. 102(a) as being anticipated by Frank Dellaert (“Monte Carlo EM for Data-Association and its Applications in Computer Vision”, September 21, 2001, CMU-CS-01-153, School of Computer Science, Carnegie Mellon University).

a. Referring to Claim 1, Dellaert discloses receiving image data comprising a plurality of photographic images of a three-dimensional scene (see figure 1.2 on page 12, a plurality of image of a three-dimensional building are captured); receiving user input indicating a plurality of corresponding features each appearing in at least two of the

plurality of photographic images (user indicates a plurality of corresponding features, the circles shown in figure 1.2); determining an error function for reverse-rendering function, the reverse-rendering function defining a relationship between three-dimensional coordinates in the three-dimensional scene and corresponding two-dimensional coordinates of the plurality of corresponding features (page 29, the maximum likelihood estimate function 2.1 is the claimed “reverse-rendering function”, which defines relationships between 3D points and the points in the 2D images, also see equation 2.2; equation 2.3 is the claimed “error function”); and minimizing the error function to determine a solution corresponding to a global minimum of the error function, comprising calculating at least first derivatives of the error function using automatic differentiation, thereby computing intermediate solution estimates for successive iterations of the error function, until the solution estimates converge to the solution (see Appendix A, page 203, equation A.1 for error minimization; and the minimization process is iterative as described in A.1 continued on page 204; and the Jacobian of $\bar{h}()$ is H_r , which is the claimed “first derivatives”. For convergence please see paragraph 1 in section A.2 on page 204. Note the calculation of the Jacobians, the first derivatives, is done using automatic differentiation as described on page 211).

b. Referring to Claim 2, Dellaert discloses wherein the determining step further comprises determining the error function comprising reverse-rendering parameters selected from group consisting of camera position, camera orientation, focal length, aperture size, lens distortion, and distortion of focal plane (see section A.3 for camera parameters).

- c. Referring to Claim 3, Dellaert discloses wherein the determining step further comprises determining the error function comprising reverse-rendering parameters including at least one camera position located within the three-dimensional scene (see section A.3).
- d. Referring to Claim 4, Dellaert discloses further comprising receiving an initial scene graph comprising at least a portion of an initial solution estimate (page 204, an initial guess Θ^0 is the claimed “initial solution estimate”).
- e. Referring to Claim 5, Dellaert discloses wherein the receiving an initial scene graph step further comprises receiving the initial scene graph comprising at least one transform defining a relationship between a parent object and a child object (page 63, in the first step of algorithm, the motion estimate is included in the initial guess. Such motion estimate can be done using JPDAF, page 44, section 3.2.2, which comprises a transform to define a relationship between at least two objects).
- f. Referring to Claim 6, Dellaert discloses wherein the minimizing step further comprises calculating an exact Hessian of the error function (page 205, equation A.4).
- g. Referring to Claim 7, Dellaert discloses further comprising initializing at least selected three-dimensional coordinates of the plurality of corresponding features and camera parameters for the plurality of photographic images as an initial solution estimate (section A.3 on pages 206 and 207).
- h. Referring to Claim 8, Dellaert discloses defining a resulting scene graph for scene consistent with the solution (Dellaert teaches using non-linear minimization, which iteratively optimize the maximum-likelihood of the matching, which at the end defines a

resulting scene graph for scene consistent with the solution, also see section A.3 for change with respect to an arbitrary parameter and change in camera parameters, and section 2.2 about motion model parameters. All of these parameters require the error minimization updated recursively to achieve a resulting scene graph).

i. Referring to Claim 9, Dellaert discloses wherein the determining step further comprises determining the error function further defined by a user-selected differentiable relationship between user-selected parameters of the reverse-rendering function (section A.6 on page 211, Dellaert teaches the parameters in automatic differentiation can be defined by the user to achieve desired error function minimization).

j. Referring to Claim 10, Dellaert discloses wherein the determining step further comprises determining the error function defined by animation parameters to solve match-moving relationships between frames of a motion picture sequence (motion model parameters are the claimed “animation parameters”).

k. Referring to Claim 11, Dellaert discloses wherein receiving step further comprises receiving the plurality of photographic images representing a time sequence, wherein the determining step further comprise determining the error function further defined by time parameters for solving match-moving relationships between frames of a motion picture sequence, and wherein the minimizing step further comprises minimizing the error function simultaneously over the frames (section 2.2 on page 28, Dellaert teaches the time-varying structure can be accommodated using straightforward modifications. The time-varying herein means motion spread through a sequence of frame images. Also see sections 3.1.5 and 3.3).

- l. Referring to Claim 12, Dellaert discloses wherein the receiving image data step comprises receiving the photographic images comprising digital images from a digital camera (the photographic images shown in figure 1.2 on page 12 are taken by a digital camera).
- m. With regard to Claim 13, see explanation in Claim 1.
- n. With regard to Claim 14, see explanation in Claims 2 and 4.
- o. With regard to Claim 15, see explanation in Claim 5.
- p. With regard to Claim 16, see explanation in Claim 9.
- q. With regard to Claim 17, see explanation in Claim 10.
- r. With regard to Claim 18, see explanation in Claim 6.
- s. With regard to Claim 19, see explanation in Claim 1, the algorithm in Dellaert is implemented on a computer.
- t. With regard to Claim 20, see explanation in Claim 14.
- u. With regard to Claim 21, see explanation in Claim 16.
- v. With regard to Claim 22, see explanation in Claim 17.
- w. With regard to Claim 23, see explanation in Claim 18.
- x. With regard to Claim 24, see explanation in Claim 11.
- y. With regard to Claim 25, see explanation in Claim 3.

Conclusion

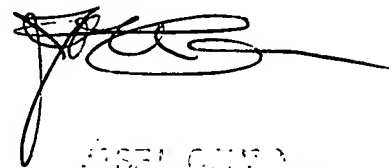
- 3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom Y Lu whose telephone number is (703) 306-4057. The examiner can normally be reached on 8:30AM-5PM.

Art Unit: 2621

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tom Y. Lu



ASSIGNED
TERRY TOWNET